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Mechanics of Finite Cracks in Dissimilar Anisotropic Elastic Media Considering Interfacial Elasticity

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Abstract:

In this presentation, interfacial crack fields and singularities in bimaterial interfaces (i.e., grain boundaries or dissimilar materials interfaces) are considered through a general formulation for two-dimensional (2-D) anisotropic elasticity while accounting for the interfacial structure by means of a generalized interfacial elasticity paradigm. The interfacial elasticity formulation introduces boundary conditions that are effectively equivalent to those for a weakly bounded interface. This formalism considers the 2-D crack-tip elastic fields using complex variable techniques. While the consideration of the interfacial elasticity does not affect the order of the singularity, it modifies the oscillatory effects associated with problems involving interface cracks. Constructive or destructive "interferences" are directly affected by the interface structure and its elastic response. This general formulation provides an insight on the physical significance and the obvious coupling between the interface structure and the associated mechanical fields in the vicinity of the crack tip.

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